

Electrophoretic Evidence for the Presence of *Tandanus tandanus* (Pisces: Plotosidae) Immediately North and South of the Hunter River, New South Wales

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Jerry, D.R. (2005). Electrophoretic evidence for the presence of *Tandanus tandanus* (Pisces: Plotosidae) immediately north and south of the Hunter River, New South Wales. *Proceedings of the Linnean Society of New South Wales* **126**, 121-124.

Eel-tailed catfish from the genus *Tandanus* are morphologically conservative. Previous allozyme electrophoretic surveys have demonstrated that up to three species of *Tandanus* catfish occur in south-eastern Australian freshwater streams. Two of these species are previously undescribed cryptic species. However, the taxonomic status of catfish in many coastal river systems is yet to be examined using allozyme electrophoresis. In this study four diagnostic allozyme markers were used to determine the taxonomic status of eel-tailed catfish in four NSW coastal populations from the Wallamba, Coolongolook, Hawkesbury and Georges River systems. Electrophoretic analyses demonstrated that the species of catfish in these four populations is *T. tandanus*. These results extend the distribution of *T. tandanus* to the coastal rivers immediately north and south of the Hunter River, NSW.

Manuscript received 12 July 2004, accepted for publication 15 December 2004.

KEYWORDS: allozymes, catfish, cryptic species, *Tandanus*.

INTRODUCTION

The eel-tailed catfish, *Tandanus tandanus* (Mitchell 1838), had until recently been regarded as a single, broadly distributed species that inhabits freshwater streams throughout the Murray-Darling Basin and coastal drainages of eastern Australia (Allen 1989). However, allozyme electrophoresis studies in the 1990's demonstrated that what was originally thought to be one species of *Tandanus* was in fact a complex assemblage containing up to an additional two undescribed cryptic species (Musyl 1990, Musyl and Keenan 1996, Jerry and Woodland 1997). These studies highlighted that the taxonomy of *T. tandanus* should be revised to recognise the presence of at least three species of *Tandanus* in south-eastern Australia; i) *T. tandanus* which occurs throughout the Murray-Darling River Basin and in the Mary, Brisbane and Hunter coastal rivers; ii) an undescribed species of *Tandanus* within the coastal river systems between and including the Bellinger River and Manning Rivers and; iii) an undescribed species of *Tandanus* restricted to the coastal basin of the Clarence River system (and possibly the Richmond and Tweed River

systems) (Fig. 1) (Jerry and Woodland 1997).

The taxonomic status of eel-tailed catfish in many other NSW coastal river systems, however, is unresolved. For example, it is not known what taxonomic variant occurs immediately north and south of the Hunter River population of *T. tandanus*. Of particular interest is whether the distribution of the "Bellinger" variant of *Tandanus* extends south to the Hunter River, or whether *T. tandanus* extends north. The aim of the present study therefore was to use species diagnostic allozyme markers to determine whether *T. tandanus* has a wider distribution in the coastal drainages immediately north and south of the Hunter River (the area designated "taxonomy uncertain" in Fig. 1).

MATERIALS AND METHODS

Catfish were sampled from four coastal river drainages north and south of the Hunter River, NSW. The populations sampled were the Wallamba and Coolongolook Rivers (north of the Hunter River) and the Hawkesbury and Georges Rivers (south of the

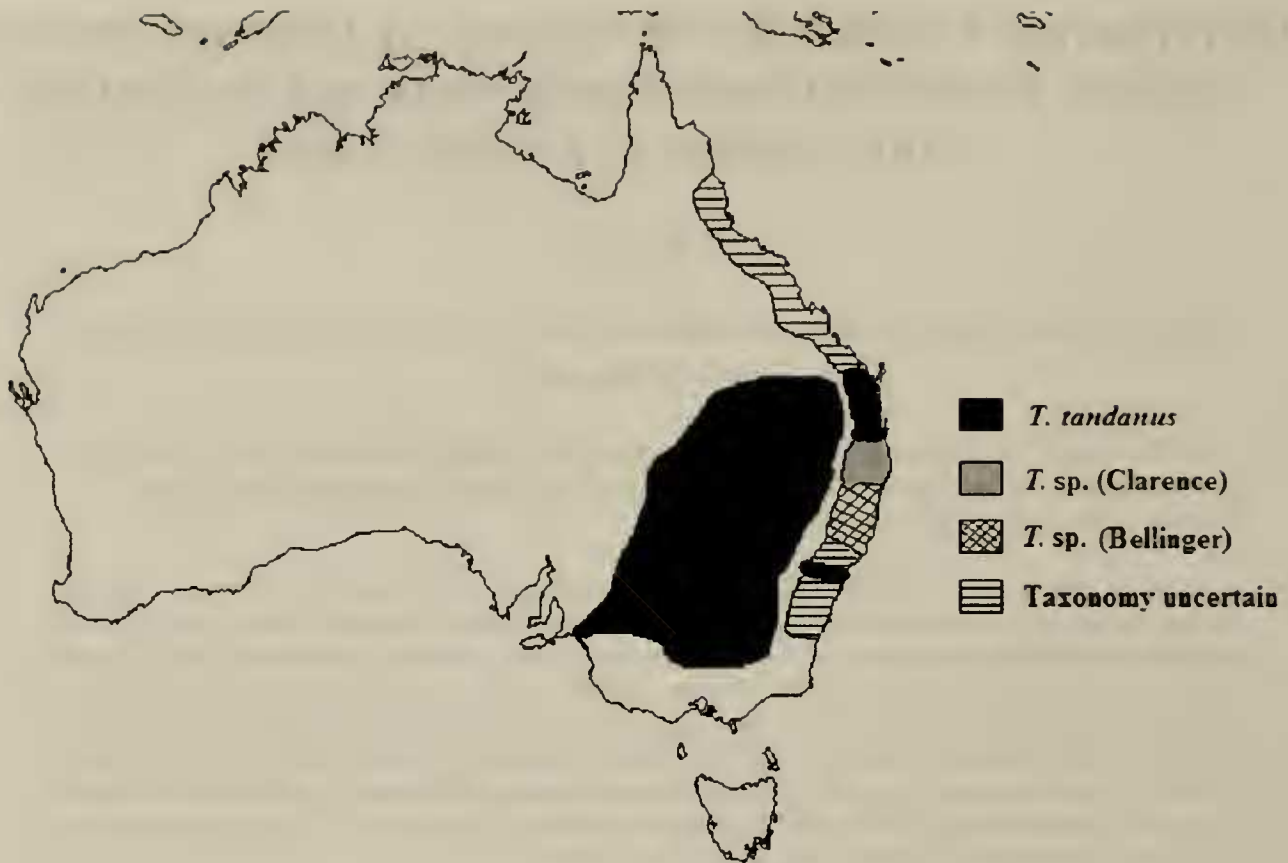


Figure 1. Distribution of *Tandanus tandanus*, *Tandanus sp* (Clarence) and *Tandanus sp* (Bellinger) in eastern Australia. *T. tandanus* occurs in the Murray-Darling, Brisbane, Mary and Hunter River drainages, *T. sp* (Clarence) in the Clarence and possibly Richmond and Tweed Rivers, and *T. sp* (Bellinger) in the Bellinger, Macleay, Hastings and Manning Rivers. Note; *Tandanus* catfish also inhabit other coastal drainages throughout eastern Australia, however, the taxonomic status of these populations has not been confirmed using diagnostic allozyme markers and it is possible that one or more cryptic species are present. Currently they are considered to be *T. tandanus*.

Hunter River) (Fig. 2). Catfish were opportunistically sampled by gill netting during biological surveys (K. Bishop, personal communication), with two adult specimens collected from each of the river drainages. Upon capture whole specimens were immediately frozen and shipped to the laboratory on dry ice where liver and muscle tissues were excised. Tissue samples were prepared for electrophoresis according to the methods described by Shaklee and Keenan (1986).

Musyl (1990) and Musyl and Keenan (1996) identified four *Tandanus* species diagnostic allozyme markers (International Enzyme Commission Number in parentheses); Glucose-6-phosphate isomerase GPI* (5.3.1.9.), Esterase EST* (3.1.1.-), Umbelliferyl esterases UMB-1* and UMB-2* (3.1.1.-). These markers were used to delineate the taxonomic status of the catfish samples according to the running and scoring conditions described in Jerry and Woodland (1997). To confirm the mobility of diagnostic alleles, the test populations were run against reference specimens of *T. tandanus* (Hunter River) and *T. sp* "Bellinger" (Manning River) in line-up gels for all

enzyme systems.

RESULTS

Catfish sampled from the four riverine systems exhibited identical allele mobilities at all enzyme loci to those of the *T. tandanus* reference sample from the Hunter River (Table 1). More specifically, test catfish samples exhibited the slower EST*(100) and UMB-2*(100) and the faster GPI*(100) and UMB-1*(100) alleles compared to the mobility of alleles diagnostic to the "Bellinger" variant from the Manning River. Although sample sizes were very small, no genetic variation was observed at any of the allozyme loci. This is consistent with the loci being "fixed" and diagnostic for different alleles among the various species.

DISCUSSION



Figure 2. River populations of *Tandanus* sampled from coastal drainages of central NSW. Hatched area represents known distribution of *Tandanus* sp (Bellinger) (ie Bellinger River south to the Manning River).

Fixed alleles at the allozyme markers GPI*, EST*, UMB-1* and UMB-2* have been shown by several authors to be diagnostic in discriminating between the three known species of *Tandanus* inhabiting rivers and streams of south-eastern Australia (Musyl 1990, Musyl and Keenan 1996, Jerry and Woodland 1997). Therefore, based on the electrophoretic evidence presented herein, catfish that inhabit the two major coastal river drainages both north and south of the Hunter River can be considered to be *T. tandanus*.

The known distributional range of *T. tandanus* in coastal drainages of NSW can be extended to include the Wallamba, Coolongolook, Hawkesbury-Nepean and Georges River systems. A variant of *Tandanus* is also found in coastal drainages as far south as the Shoalhaven River in southern NSW and given the close geographical proximity of these drainages, is likely to be *T. tandanus*. However, further studies will be required to verify the taxonomic status of this population.

Table 1. Allele motility at four species diagnostic allozyme loci of *Tandanus* catfish sampled from four NSW coastal rivers. Allele mobility is calculated as the relative distance moved in the gel of the allele compared to that of the Hunter River population (designated a mobility of 100). The Manning River sample is a representative of the “Bellinger” species of *Tandanus* (Jerry and Woodland 1997).

Locus	Hunter	Wallamba	Coolongolook	Hawkesbury	Georges	Manning
EST*	100	100	100	100	100	112
GPI-1*	100	100	100	100	100	84
UMB-1*	100	100	100	100	100	85
UMB-2*	100	100	100	100	100	119

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ACKNOWLEDGEMENTS

I would like to thank Mike Ramsey who ran some of the line-up allozyme gels and Keith Bishop for providing the test catfish samples.

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